WHAM evidence summary: turmeric for treating radiation dermatitis

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CLINICAL QUESTION

What is the best available evidence for turmeric products for treating radiation dermatitis?

SUMMARY

Turmeric (*Curcuma longa*) is a spice harvested in India and other Asian countries that has traditionally been used to treat many ailments, including skin conditions. It is recognised as having anti-inflammatory, antioxidant and antiseptic effects that could play a role in reducing radiation dermatitis, which frequently occurs during radiotherapy because of morphological skin changes. *Level 1* evidence[1] suggested oral turmeric taken throughout the course of radiotherapy is associated with a delay in onset and severity of radiation dermatitis. *Level 1* evidence[2–4] reporting on topical turmeric preparations was mixed. Two small studies[2,3] found that topical turmeric reduces onset and severity of radiation dermatitis, while a third, larger study[4] found no difference in effect compared to other topical preparations. More research on the potential benefits from application of a turmeric-based product during radiotherapy is required.

CLINICAL PRACTICE RECOMMENDATIONS

All recommendations should be applied with consideration to the wound, the person, the health professional and the clinical context.

> Oral turmeric could be considered as an adjunct therapy to reduce the severity of radiation dermatitis in selected people receiving radiation therapy (Grade B).
>
> There is insufficient evidence to make a graded recommendation on the use of topical turmeric preparations to reduce the severity of radiation dermatitis

Emily Haesler
PhD Post Grad Dip Adv Nurs (Gerontics) BNurs Fellow Wounds Australia
Adjunct Professor Wound Healing and Management Collaborative, Curtin Health Innovation Research Institute, Curtin University, WA

SOURCES OF EVIDENCE: SEARCH AND APPRAISAL

This summary was conducted using methods published by the Joanna Briggs Institute[5–7]. The summary is based on a systematic literature search combining search terms related to turmeric/curcumin/curcuma longa and radiation dermatitis. Studies reporting turmeric for management of other wounds or skin conditions (e.g., psoriasis) were excluded. Searches were conducted in the CINAHL, PubMed® and Hinari databases and in the Cochrane Library for evidence conducted in humans published up to April 2022 in English. Levels of evidence for intervention studies are reported in Table 1.

BACKGROUND

Turmeric (*C. longa*) is a spice prepared from a rhizome that is used as a traditional medicine in India and other Asian countries. Curcumin, which is the active chemical substance in turmeric[17,18], is described as having anti-inflammatory, antioxidant, antiseptic and anti-cancer effects[15,18–20].

Radiation dermatitis is a common side effect that affects up to 95% of people receiving radiotherapy for the management of breast cancer[4,14,16]. Radiotherapy can damage epithelial cells, decreasing the thickness of the epidermis and leading to increasing severity of signs and symptoms as radiotherapy continues, including warmth, pruritus, erythema, oedema, exudate, burning and pain[21]. It is theorised that curcumin may be effective in reducing the morphological changes that occur to the skin during radiation therapy by decreasing expression of inflammatory cytokines, growth factors and tumour necrosis factor[2,12,14,15]. Essentially, the anti-inflammatory and antioxidant properties of curcumin are considered advantageous in protecting against the processes that lead to radiation dermatitis[14].

CLINICAL EVIDENCE

The evidence on turmeric products used to treat radiation dermatitis is summarised in Table 2.

Oral turmeric to treat radiation dermatitis

A meta-analysis[1] at low risk of bias reported the use of oral curcumin for people receiving radiotherapy. This meta-analysis was conducted to inform an evidence-based clinical guideline[22]

and included two randomised clinical trials (RCTs)[9,10] (n=716). In both the RCTs, people with breast cancer received either 6g curcumin daily (across three doses) or placebo, commencing at the start of radiotherapy and concluding 1 week after radiotherapy finished. There was a reduced risk of experiencing Grade 2 or higher radiation dermatitis associated with oral curcumin (risk ratio [RR]=0.64, 95% confidence interval [CI]=0.42 to 0.96, absolute risk reduction [ARR]=48 fewer cases per 1,000), but the mean difference in Radiation Dermatitis Severity (RDS) score was low (0.8 lower)[1] and the RDS score was not statistically significantly different between groups at the end of treatment (p=0.55)[22]. The evidence was of low certainty and the withdrawal rate was high (curcumin group 18% versus control group 14%)[22]. The guideline developers made no recommendation on curcumin primarily due to potential interaction with medications, lack of cost-effectiveness data, and small anticipated desirable effects[22] (*Level 1*).These studies were also reported in other reviews[8,12–16] that were at higher risk of bias but that reached similar conclusions that oral curcumin was associated with some positive outcomes (*Level 1 and 5*).

Topical turmeric to treat radiation dermatitis

An RCT[4] (n=191) at low risk of bias compared curcumin gel (4% concentration) to HPR™ Plus (described as a white lotion, FDA-approved medical device) to a placebo gel for reducing the severity of radiation dermatitis in people with breast cancer. The topical preparations were applied three times daily from the base of the neck to underneath the breast fold, including the side of the breast and under the arm, commencing with the start of radiotherapy and continuing until 1 week after therapy ceased. There were no statistically significant differences in mean RDS scores (curcumin 2.68 versus HPR™ Plus 2.64 versus placebo 2.63, p=0.929) or rate of moist desquamation (curcumin 25.42% versus HPR™ Plus 20.34% versus placebo 22.64%, p=0.805)[4]. This study had overall low rates of radiation dermatitis, and some potential benefits of turmeric therapy were reported in sub-analyses, but the study was not designed to measure these effects (*Level 1)*.

An RCT[2] (n=50) at moderate risk of bias compared the effect of a topical turmeric–sandalwood cream (16% turmeric extract) to a control (baby oil) for treating radiation dermatitis in people with head and neck cancer. The treatment for both groups was applied five times daily, from the first day of radiotherapy until 2 weeks after therapy concluded (approximately 9 weeks). After 2 weeks, no participants had experienced radiation dermatitis. From week 3 to week 7 the incidence of radiation dermatitis increased in both groups, with statistically significantly lower rates in the turmeric-based cream group in week 3 (12% versus 41.67%, p<0.045) and week 4 (37.5% versus 75%, p<0.028). Severity of radiation dermatitis evaluated using the Radiation Therapy Oncology Group/European Organisation for Research and Treatment Cancer (RTOG/EORTC) score was statistically significantly lower for the turmeric-based cream group from week 3 until conclusion of the study (p<0.05 for all). Grade 3 radiation dermatitis occurred less often in the turmeric-based cream group (9.5% versus 37.5%, p<0.01) and no participants in the study experienced Grade 4 radiation dermatitis[2] (*Level 1*).

A more recent RCT[3] (n=50) at moderate risk of bias conducted by the same research team[2] explored topical turmeric–sandalwood cream (16% turmeric extract) for women with breast cancer undergoing radiotherapy. The comparator was baby oil, and the treatment regimen was the same as in the study above[2]. At the end of the second week of radiotherapy, the turmeric-based cream group had a statistically significantly lower rate of radiation dermatitis (32% versus 75%, p=0.0025). In both groups, rates of radiation dermatitis increased throughout the trial, but were statistically significantly lower in the turmeric-based cream group at every weekly measurement (p<0.05 for all)[3] (*Level 1*).

CONSIDERATIONS FOR USE

- Patient-reported outcomes, including pain and skin-related quality of life, were not statistically significantly different compared to a placebo for people taking oral curcumin[10] or for people using topical curcumin[4].
- Few adverse events have been reported in the literature[8–10,12,13]. Some evidence indicates curcumin can increase oxalate levels in the kidneys, contributing to development of kidney stones[11]. Potential to exacerbate gallstone symptoms has also been reported[8].
- Curcumin has low bioavailability, which means it is poorly absorbed and used by the body[8,10,12,13] and excreted rapidly[8,16]. Ongoing research is attempting to develop delivery mechanisms (e.g., encapsulation within nanoparticle carriers and developing water-soluble formulations) that will increase its clinical utility[10,16].

CONFLICTS OF INTEREST

The author declares no conflicts of interest in accordance with International Committee of Medical Journal Editors (ICMJE) standards.

Table 1. Levels of evidence for clinical studies

Level 1 evidence	Level 2 evidence	Level 3 evidence	Level 4 evidence	Level 5 evidence
Experimental designs	**Quasi-experimental designs**	**Observational – analytic designs**	**Observational – descriptive studies**	**Expert opinion/ bench research**
Level 1.a Systematic review of RCTs[1] Level 1.b Systematic review of RCTs and other study designs[8] Level 1.c RCT[2–4,9,10]	Nil	Nil	Nil	Level 5.a Non-systematic literature review[11–16]

Table 2. Summary of the evidence

Turmeric treatment (no. participants)	Comparison treatment (no. participants)	Participant characteristics	Duration of treatment	Outcome measures	Level of evidence
Ryan Wolf et al. (2018)[10]					
6g daily oral turmeric across three doses (n=349 commenced, n=283 evaluated)	Placebo daily in three doses (n=342 commenced, n=295 evaluated)	Primarily Caucasian women, mean age 57 years, breast cancer, mean radiation dose 48.34 Gy	Commenced with radiation therapy and continued for 1 week following therapy completion (approx. 29 sessions)	Radiation Dermatitis Severity (RDS) score Skindex-29 scale (skin related quality of life) McGill Pain Questionnaire	Level 1
Ryan et al. (2013)[9]					
6g daily oral turmeric across three doses (n=17 commenced, n=14 evaluated)	Placebo daily in three doses (n=18 commenced, n=16 evaluated)	Primarily Caucasian women, mean age 58 years, breast cancer, mean radiation dose 46.51 Gy	Throughout radiation therapy (approx. 30 sessions)	RDS score Symptom Inventory with 19 items measuring adverse events and quality of life McGill Pain Questionnaire	Level 1
Ryan Wolf et al. (2020)[4]					
Curcumin gel (Psoria-Gold® Curcumin) (n=64 commenced, n=59 evaluated)	Placebo (n=61 commenced, n=52 evaluated) HPR™ Plus (n=63 commenced, n=59 evaluated)	Primarily Caucasian women, mean age 60 years, breast cancer, mean radiation dose 59 Gy	Commenced with radiation therapy and continued for 1 week following therapy completion (approx. 8 weeks)	RDS score NIH Common Terminology Criteria-Adverse Events (CTCAE) Pain diary Skin-Pain Inventory Questionnaire on product use	Level 1
Palatty et al. (2014)[2]					
Curcumin – sandalwood cream (Vicco® Turmeric Cream) applied five times daily (n=25 commenced, n=22 evaluated)	Johnson's® baby oil applied five times daily (n=25 commenced, n=24 evaluated)	Primarily men, mean age approx. 55 years, head/neck cancer, mean radiation dose 66 Gy	Commenced with radiation therapy and continued for 2 weeks following therapy completion (approx. 9 weeks)	Radiation Therapy Oncology Group/European Organisation for Research and Treatment Cancer (RTOG/EORTC) scores	Level 1
Rao et al. (2017)[3]					
Curcumin – sandalwood cream (Vicco® Turmeric Cream) applied five times daily (n=20)	Johnson's® baby oil applied five times daily (n=20)	Women with breast cancer, mean age approx. 50 years, mean radiation dose 50 Gy	Throughout radiation therapy (approx. 5 weeks)	RTOG/EORTC scores	Level 1

ABOUT WHAM COLLABORATIVE EVIDENCE SUMMARIES

The WHAM Collaborative evidence summaries are consistent with methodology published in Munn, Lockwood and Moola[23].

Methods are outlined in resources published by the Joanna Briggs Institute[5–7] and on the WHAM Collaborative website: http://WHAMwounds.com. WHAM evidence summaries undergo peer review by an international, multidisciplinary Expert Reference Group. WHAM evidence summaries provide a summary of the best available evidence on specific topics and make suggestions that can be used to inform clinical practice. Evidence contained within this summary should be evaluated by appropriately trained professionals with expertise in wound prevention and management, and the evidence should be considered in the context of the individual, the professional, the clinical setting and other relevant clinical information.

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